Claims

1. A Gram-positive bacterium which has been transformed with heterologous genes encoding alcohol dehydrogenase and pyruvate decarboxylase wherein said genes are expressed at sufficient levels to confer upon said Gram-positive bacterium transformant the ability to produce ethanol as a fermentation product.

2. The Gram-positive bacterium, according to claim 1, wherein said host is selected from the group consisting of *Bacillus*, *Lactobacillus*, *Streptococcus*, *Fibribacter*, *Ruminococcus*, *Pediococcus*, *Cytophaga*, *Cellulomonas*, *Bacteroides*, and *Clostridium*.

3. The Gram-positive bacterium according to claim 2, wherein said host is a *Bacillus* sp.

4. The Gram-positive bacterium, according to claim 3, wherein said *Bacillus* sp. is selected from the group consisting of *B. subtilis* and *B. polymyxa*.

5. The Gram-positive bacterium, according to claim 1, which has been transformed with *Z. mobilis* genes encoding alcohol dehydrogenase and pyruvate decarboxylase.

6. The Gram-positive bacterium according to claim 1, wherein said bacterium is further transformed with a gene encoding an enzyme which degrades oligosaccharides.

7. The Gram-positive bacterium, according to claim 6, wherein said enzyme which degrades oligosaccharides is a polysaccharase.

8. The Gram-positive bacterium according to claim 7, wherein said polysaccharase is selected from the group consisting of cellulolytic, xylanolytic, and starch-degrading enzymes.

9. The Gram-positive bacterium, according to claim 1, wherein said heterologous genes are incorporated onto the chromosome of said bacterium.

10. A method for the production of ethanol, said method comprising transforming a Gram-positive bacterial host with heterologous genes encoding pyruvate decarboxylase and alcohol dehydrogenase wherein said genes are expressed at sufficient levels to result in the production of ethanol as a fermentation product.

11. The method, according to claim 10, wherein said host is selected from the group consisting of *Bacillus*, *Lactobacillus*, *Streptococcus*, *Fibribacter*, *Ruminococcus*, *Pediococcus*, *Cytophaga*, *Cellulomonas*, *Bacteroides*, and *Clostridium*.

12. The method, according to claim 11, wherein said host is a *Bacillus* sp.

13. The method, according to claim 12, wherein said *Bacillus* sp. is selected from the group consisting of *B. subtilis* and *B. polymyxa*.

14. The method, according to claim 10, wherein said Gram-positive bacterium has been transformed with *Z. mobilis* genes encoding alcohol dehydrogenase and pyruvate decarboxylase.

15. The method, according to claim 10, wherein said bacterium is further transformed with a gene encoding an enzyme which degrades oligosaccharides.

16. The method, according to claim 15, wherein said enzyme which degrades oligosaccharides is a polysaccharase.

17. A method for reducing the accumulation of acidic metabolic products in the growth medium of Gram-positive bacteria, said method comprising transforming said bacteria with heterologous genes which express alcohol dehydrogenase and pyruvate decarboxylase at sufficient levels to result in the production of ethanol as a fermentation product.

18. A plasmid designated pLOI1500.